

**HYPERTENSIVE DISORDERS OF
PREGNANCY, COMPLICATIONS AND OBSTETRIC OUTCOME
AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA.**

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HYPERTENSIVE DISORDERS OF PREGNANCY, COMPLICATIONS AND OBSTETRIC OUTCOME AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA.

Nkubito GK, Stray-Pedersen B, Hussain A.

ABSTRACT

OBJECTIVES: To determine the prevalence, maternal complications, foetal outcome and characteristics of patients with hypertensive disorders of pregnancy.

SETTING: Princess Marina Hospital, a tertiary and referral Hospital in Gaborone, Botswana.

MATERIALS AND METHODS: A retrospective chart review of all hypertensive women who delivered at Princess Marina Hospital from December 2002 to April 2003 was done.

Information from patients' records was entered on a compilation sheet which was entered in SPSS program and analyzed. Prevalence rates (per 1000 deliveries) were estimated by type of hypertension. Demographic characteristics, maternal complications and perinatal outcome were also determined.

RESULTS: Of 1919 deliveries at Princess Marina Hospital during the study period, there were 100 cases of hypertensive disorders of pregnancy giving a prevalence of 52.1 per 1000 deliveries. Twenty one cases had chronic hypertension of which 11 (52%) developed superimposed pre-eclampsia while 10(48%) had no proteinuria.

Of 79 patients with pregnancy induced hypertension, 36 (46%) had hypertension without proteinuria, 42(53%) had pre-eclampsia and 1(1%) had eclampsia.

Age ranged from 18 to 47 years with a mean age of 29.5 years. Teenagers were 8 cases out of 100. Maternal complications were HELLP syndrome (3 cases), acute renal failure (2 cases), and disseminated intravascular coagulation (1 case). There were no cases of abruptio placentae, cerebral haemorrhage or maternal death.

Of all deliveries, perinatal complications included preterm deliveries (45%), low birth weight (41%) and still births (17%).

Conclusion: The prevalence of hypertensive disorders of pregnancy was high but there were few maternal complications.

ABBREVIATIONS

HELLP SYNDROME: Haemolysis, elevated liver enzymes, low platelet count

DIC: Disseminated intravascular coagulation

MmHg: Millimeters of mercury

PIH: Pregnancy induced hypertension.

PMH: Princess Marina Hospital

LCH: Lilongwe Central Hospital

ANC Antenatal Care.

SPSS Statistical Package for Social Sciences

WKS Weeks

BP Blood pressure

mmHg millimeters of mercury

WT weight

G grams

Dedication:

This work is dedicated to Steven, EJM, Frida and Emmanuel.

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Thank you very much.

DEFINITION OF TERMS:

Hypertensive disorders of pregnancy (HDP): Hypertensive disorders of pregnancy include chronic hypertension and Pregnancy Induced Hypertension (PIH).

Chronic hypertension: If hypertension occurs before 20 weeks of gestation it is classified as chronic hypertension.

PIH: If hypertension occurs after 20 weeks of gestation, during labour or within 48 hours of delivery, it is classified as pregnancy induced hypertension (P.I.H).

Classification of P.I.H

Hypertension without proteinuria: Two readings of diastolic blood pressure 90-110 mmHg, 4 hours apart, after 20 weeks of gestation and there is no proteinuria

Mild PIH: Two readings of diastolic blood pressure 90-110mmHg, 4 hours apart, after 20 weeks of gestation, with proteinuria up to 2+.

Severe PIH: Diastolic blood pressure is equal or greater than 110mmHg after 20 weeks of gestation. There may be severe headache, blurred vision, epigastric pain, hyper-reflexia, oliguria (urinary output equal or less than 400mls/24 hours, proteinuria (protein equal or greater than 5g/24hours; dipstick +++), increased weight equal or more than 1000g/week, and the patient is conscious.

Eclampsia: Mother is unconscious and shows typical grand mal seizures or coma. Oligohydrouria or anuria is present plus other signs and symptoms of severe pre-eclampsia (1, 2).

Perinatal period: The perinatal period comprises the period from 28 completed weeks of gestation to the end of 7th completed day of life.

Birth weight: The birth weight is the weight of a new born infant obtained preferably

within one hour of birth.

Low birth weight (LBW): Refers to the birth weight of less than 2500g (that is up to and including 2499g).

Gestational age: The duration of gestation is measured from the first day of the last menstrual period. It is expressed in completed weeks.

Preterm period: Preterm period refers to less than 37 completed weeks of gestation.

The term period: Term period starts after 37 completed weeks and continues up to the end of 42nd week.

Post-term period: This period refers to the pregnancy length of more than 42 completed weeks of gestation.

Live births: A live birth has occurred when the new born infant breathes or shows any sign of life, such as heart beat, pulsation in the umbilical cord or movements of the voluntary muscles.

Still birth: The birth of a foetus showing no sign of life. For international comparisons of perinatal mortality rates still born infants with a birth weight of 1000g or 28 completed weeks of gestation are included.

Still birth rate: Still birth rate is defined as the number of still born infants per 1000 total births (still born and live born infants).

Early neonatal death: This refers to the death of a live born infant during the first 7 days of life.

Late neonatal death: This refers to the death of a live born infant after 7 completed days, but before 28 completed days, after birth.

Perinatal death: Perinatal death comprises the sum of all still births and early neonatal

death.

Perinatal mortality rate: Perinatal mortality rate is the sum of all perinatal deaths in relation to the sum of all still born and live born infants.

Maternal death: Maternal death is death of a woman while pregnant or within 42 completed days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or by its management but not due to accidental or incidental causes.

Maternal mortality ratio: Maternal mortality ratio is the number of maternal death per 1000 total births (2).

CHAPTER ONE

Introduction: Hypertensive disorders of pregnancy (HDP) take a significant toll among women suffering from severe maternal morbidity, often resulting in maternal mortality. More than 80% of maternal deaths world wide are due to five direct causes: haemorrhage, sepsis, unsafe abortion, obstructed labour and hypertensive disorders of pregnancy (4).

The most severe complications of hypertensive disorders of pregnancy are observed in poor settings where antenatal diagnosis and management of these diseases are deficient. Pregnant women may not complain about subjective symptoms even in advanced stages of hypertensive diseases during pregnancy. Thus, the most severe complications, such as intra uterine foetal death and eclampsia, may occur without any prior maternal complaints.

Profile of Botswana:

The Republic of Botswana is a land locked country situated in Southern Africa, nestled between South Africa, Namibia, Zimbabwe, and Zambia.

FIGURE 1

MAP OF BOTSWANA SHOWING THE LOCATION OF THE STUDY SITE



Location: Southern Africa, north of South Africa

Geographic coordinates: 22 00 S, 24 00 E

Area: total: 600,370 sq km land: 585,370 sq km water: 15,000 sq km

Climate: Semiarid; warm winters and hot summers

Terrain: predominantly flat to gently rolling tableland; Kalahari Desert in southwest

Natural resources: diamonds, copper, nickel, salt, soda ash, potash, coal, iron ore, silver

Natural hazards: periodic droughts; seasonal August winds blow from the west, carrying sand and dust across the country.

Environment: Current issues: overgrazing; desertification; limited fresh water resources

Geography: landlocked; population concentrated in eastern part of the country(5).

Population and demographic characteristics:

Botswana has a population of 1,680,863 people and a population density of 2.3 people per square kilometer. The capital city, Gaborone has a population of 186,007 people and a population density of 1100 people per square kilometer. The estimates take into account the effects of excess mortality due to AIDS; this can result in lower life expectancy, higher infant mortality and death rates, lower population and growth rates and changes in distribution of population by age and sex than would otherwise be expected.

The population of Botswana is characterized by youthful nature as 40.3% of the population is below 15 years of age. Overall the ratio of male to female is 0.95.

Life expectancy at birth was 37.13 in 2001 and dropped to 35.29 years in 2002. It has a low fertility rate of 3.7 children born per woman compared to other African countries.

Literacy rate for total population is 78%; for male it is 75 % and female it is 81% (6, 7).

Botswana's economy:

Botswana has maintained one of the world's highest growth rates since independence in 1966. It has transformed itself from being one of the poorest countries in the world to a middle income country with a per capita GDP of \$ 6,600 in 2000 (8).

Diamond mining has fueled much of the economic expansion and accounts for one third of GDP and for three quarters of export earnings. Tourism, subsistence farming and cattle raising are other key sectors. Unemployment is officially at 19 %, but unofficial estimates place it at 40% (8).

Botswana health services:

Health care delivery system in Botswana is based on primary health care model which

emphasizes on accessibility to basic services. The system is organized into different levels based on the complexity of services provided. At the lowest level are mobile health stops followed by health posts which serve an area containing less than 500 people. A clinic like wise an outpatient facility serves 500 to 1000 people. Primary hospitals with a bed capacity of 30 to 70 beds serve as agents of primary health care and perform a range of activities which include out patient and general in patient care. Finally there are district hospitals and referral hospitals.

There is one major private hospital; Gaborone Private Hospital. There are 740 mobile health stops, 330 health posts, 222 clinics, 17 primary hospitals, 14 district hospitals, and three national referral hospitals (9). In the study area Gaborone; there are 3 maternity clinics which conduct deliveries, one referral hospital (Princess Marina Hospital), and one private hospital (Gaborone Private Hospital).

Every citizen in Botswana is said to be within a radius of 15 kilometers from professional medical help. Antenatal care coverage is over 91% (9). Maternal mortality ratio was estimated at 326 per 100,000 live births in 1991 (17) and 330 per 100,000 live births in 2002 (7).

The main causes of death were post partum haemorrhage which accounted for 30.8% of all deaths, followed by eclampsia which accounted for 19.2% and ruptured uterus which accounted for 11.5% of total death (17).

HEALTH INDICATORS FOR BOTSWANA (2002):

Indicator	Measure
Maternal mortality ratio	330 per 100,000 live births.
Antennal care coverage	91%
Skilled attendant at delivery	94%
Infant mortality rate	64.72 per 1000 live births
Under 5 mortality rate	110 per 1000 live births

Source: <http://www.nationmaster.com/country/bc/Health>, 2003-2004

CHAPTER 2

BACKGROUND:

Introduction: This thesis is a report of a retrospective review of medical records of patients with hypertensive disorders of pregnancy conducted at PMH, Gaborone, Botswana in the period from December 2002 to April 2003. This chapter of the thesis presents the epidemiology of the study, specifies the problem of the study, describes its significance and presents an overview of the methodology used.

Epidemiology: Hypertensive disorders of pregnancy include chronic hypertension and pregnancy induced hypertension (1, 2).

Hypertension complicates about 10 % of all pregnancies generally and pre-eclampsia Complicate about 5% (2). Eclampsia causes about 12% of all maternal death World wide (11).

Prevalence of HDP varies from country to country. In developed countries the incidence of eclampsia and maternal mortality and morbidity related to it decreased during recent decades as a result of antenatal care that makes diagnosis and treatment of mild and severe cases of pre-eclampsia possible (13). In developing countries prevention and detection of high risk groups is difficult because women book late for antenatal care or may not attend at all (25).

Pre-eclampsia tends to be undiagnosed until the condition has reached an advanced stage. In the United States of America hypertensive disorders affect about 50 per 1000 women and blacks are reported to be more affected than other races; 64.2/1000 and 48.6/1000, respectively (14). In Saudi Arabia, the prevalence of hypertensive disorders of pregnancy

were found to be 30/1000 while in Zimbabwe it was 80/1000 (15) and in South Africa it was found to be 46/1000 (16).

In Botswana, eclampsia was the second cause of maternal death between 1982 and 1988. It accounted for 19.2% of all maternal death (17).

Factors associated with HDP:

Pre-eclampsia is said to be more common in primigravidae (19, 20). A study done in Norway by Skjaeven *et al* (21) showed that pre-eclampsia was more common in first pregnancies and those with prolonged inter-pregnancy interval. Basso *et al* (22) also showed in their study that pre-eclampsia is associated with long inter-pregnancy interval rather than change of partners. Twin pregnancy is another risk factor for pre-eclampsia, this was confirmed in a study by Leszczynska-Gorzelak *et al* (24) in Poland.

High body mass index has also been shown to be a risk factor.

In their study; Thadhani *et al* (26), showed that the risk of gestational hypertension increased as pre gravid body mass index increased. In a similar study done in Zimbabwe by Mahomed *et al* (15), after adjusting for maternal age, parity and twin pregnancy, pre-eclampsia increased with increasing maternal arm circumference.

Prevention: Low salt diet and nutritional supplementation with calcium, magnesium, zinc, fish liver oil and evening primrose have been used. The efficacy of these measures has never been proven in large randomized trials (25). Low dose aspirin has been suggested as a preventive agent for women with pre-eclampsia (26). The Magpie trial showed that magnesium sulphate reduces the risk of eclampsia among women with pre-eclampsia (26).

Clinical significance:

Maternal outcome: Women who develop high blood pressure in pregnancy are likely to have operative delivery and induction of labour compared to the women without hypertension (2, 20). They are prone to complications such as hemolysis, elevated liver enzymes, and low platelet count (HELLP syndrome), disseminated intra-vascular coagulation (DIC), abruptio placentae, pulmonary oedema, and cerebral haemorrhage (16, 27). The most common cause of death is related to development of acute respiratory syndrome (28) and HELLP syndrome (29). Women with hypertensive disorders of pregnancy before 30 weeks of gestation or those with recurrent hypertension in pregnancy have an increased incidence of subsequent chronic hypertension (30).

Foetal outcome: The main impact on the foetus is under nutrition as a result of utero-placental vascular insufficiency that leads to intra-uterine growth retardation, intra uterine foetal death and increased neonatal morbidity and mortality (28, 29). Neonates born to women with pre-eclampsia have lower weight and require longer ventilation support (33). Severity of hypertension and presence of proteinuria is important in determining foetal outcome. Buchbinder and Sibai (34) found that there were higher rates of both preterm delivery and small for gestation age infants in women with severe gestational hypertension compared to women with mild hypertension. Newman MG *et al* (35) and Barton JR *et al* (36) found that massive proteinuria was associated with earlier gestation at delivery, lower birth weight and small for gestation age infants.

Foetal and neonatal complications are increased in women with chronic hypertension.

The risk of perinatal mortality is increased 3-4 times in women with chronic hypertension compared to the general obstetric population (37).

Economic significance: Women with hypertensive disorders of pregnancy stay longer in hospital and are likely to have operative delivery and induction of labour thus increasing the expenses for both the patients and the health care systems (15, 24, 20, 28).

Social significance: Women with hypertension in pregnancy spend longer in hospital, and this has a disruptive effect on the care of other children (15) and those who die leave children without adequate care.

Rationale for the study: The prevalence, clinical features, complications and outcome of pregnancy among hypertensive patients at Princess Marina Hospital, Botswana to our knowledge has not been documented, but clinical experience shows that it is a common and a serious problem. Studies conducted in the region for example South Africa (16) and Zimbabwe (15) did not classify hypertensive disorders of pregnancy into pre-eclampsia and pre-existing hypertension. Therefore this study clarifies the different types of hypertensive disorders and their prevalence.

The study was done with view to improve outcome of HDP patients.

Overview of methodology:

This was a retrospective study of patients with hypertensive disorders of pregnancy who delivered at PMH during the period from December 2002 to April 2003. The study population comprised of mothers who delivered during this period and had high blood pressure diagnosed during antenatal period, labour or in puerperium. Hypertension in this study was taken as a diastolic blood pressure equal to 90 mmHg or more recorded on two occasions at least six hours apart.

A compilation sheet was used to extract information from patient's case files. This included the following: demographic data, booking status, antenatal care attendance, record of labour and delivery, complications, treatment and perinatal outcome. The information collected was coded and entered in the Statistical Package for Social Sciences (SPSS) program version 11 for analysis. This study was compared to a similar study done at Lilongwe Central Hospital (LCH) in Malawi that was done using similar methods and at the same time.

Limitations of the study:

Since the information was retrieved from hospital records, some information was missing and this may have an effect on the results. The estimation of prevalence may not show a true picture since this was referral hospital. But the area prevalence may be representative since all the deliveries in the local clinics and Gaborone Private Hospital was included in the estimation.

CHAPTER 3

OBJECTIVES OF THE STUDY:

General:

To determine the prevalence of HDP and the outcome of pregnancy in hypertensive women who delivered at PMH, Gaborone, Botswana.

Specific:

1. To determine the prevalence of HDP
2. To determine maternal complications associated with HDP
3. To determine the foetal outcome of pregnancy in patients with HDP
4. To determine the characteristics of patients with HDP
5. To compare the results of the studies carried out in Malawi and Botswana.

CHAPTER 4

METHODOLOGY OF THE STUDY:

This chapter describes the methodology used in the study. The study was a retrospective study where in patient's records of women with HDP were analyzed.

Research site:

The study was carried out at PMH, which is the main referral hospital in Botswana. It is situated in Gaborone, the capital city of Botswana. It has 530 beds and about 5,000 deliveries take place per year (39).

Ethical consideration: Permission to carry out the research was obtained from the Ethical Committee of Norway, the Presidents Office in Botswana, Gaborone City Council and Princess Marina Hospital Ethical Review Board.

All the information obtained from the patients' records was handled anonymously and confidential. All assistants were PMH employees. Patients' records were not taken out of the hospital premises.

Study design:

The study design was retrospective using quantitative methods.

Study population:

Study population comprised of women in the reproductive age of 15 to 49 years. They were women who were admitted and delivered at PMH with HDP. They were Patients who were admitted in the period between December 2002 and April 2003.

Sample size:

The study population comprised of 1919 deliveries from which cases of HDP were obtained. Estimation using the prevalence of HDP for South Africa of 4.6% (11) indicated that a population of 1840 would be adequate, since the prevalence for Botswana is not known and assuming that since they are in the same region, the prevalence would be similar.

To determine the prevalence with 95% confidence interval between 40 and 60 per 1000 deliveries, the standard error would be 5/1000. The required population would be:

$$N=R/E^2 \quad (39)$$

N= sample size R= rate E= error

$$N = (4.6/100)/(0.005)^2 = 1840 \text{ deliveries.}$$

Practically, we included all the women with HDP who delivered at Princess Marina Hospital from 1st December 2002 to 30th April 2003. There were three pairs of twins and the first twin was included in the study.

Prevalence was estimated based on the following formula:

$$\text{Prevalence per 1,000} = \frac{\text{Number of cases of a disease present in the population at a specified time}}{\text{Number of persons in the population at the specified time}} \times 1,000 \quad (40)$$

Inclusion criteria:

Cases included in the study had to fulfill the following criteria:

Women who had a diastolic blood pressure equal to or greater than 90 mmHg with or without proteinuria diagnosed after 20 weeks of gestation were included; and women with pre-existing hypertension in pregnancy, irrespective of blood pressure measurements if they were on treatment. Women who developed hypertension within 48 hours of

delivery were also included.

Exclusion criteria: Pregnant women with normal blood pressure.

Pre-testing:

Prior to data collection, the compilation sheet was pre-tested on six files to check if it was a good instrument. Some few changes were made to adapt it to the information obtained in the files.

Data collection methods:

Names and in patient admission numbers were obtained from ward admission and discharge books. Names were used to retrieve the in-patient files from the hospital records department.

At PMH, patients' names are recorded in admission books which are kept in the wards and they are also entered in computers in the records department. Patients admitted to the hospital are assigned in-patient numbers that are used even on subsequent admissions. On admission, patients are given a file where all particulars of a patient are recorded. This includes demographic data of the patients and daily progress on the patients' condition, all procedures performed and all laboratory result are also kept in this file. All patients attending antenatal clinics in the government facilities are given antenatal books where all information on the patient is written. The information in the antenatal books includes demographic data of the patient, past medical history, past obstetric history, investigations. The antenatal book is kept by the patient and the patient produces it at antenatal clinic on every visit. At each antenatal visit, weight and the symphysis-fundus height are recorded. Also blood pressure and urine results are recorded.

Symphysis-fundus height is routinely measured with a patient in supine position by

palpation and using a tape measure, where by the distance between the symphysis pubis and fundus is measured in centimeters. At 16 weeks of gestation the fundus is half way between the symphysis and umbilicus, at 20 weeks of gestation the fundus is at the umbilicus and after 22 weeks fundal height in centimeters is equal to weeks of gestation. If there is a discrepancy between weeks of gestation from the last menstrual history and the measured symphysis-fundus height by 2-3 cm this would indicate; intra uterine growth retardation, twin pregnancy, polyhydroamnios or wrong dates and in this case a patient would be referred for ultra sound assessment.

Proteinuria is routinely measured using dip sticks on each antenatal visit. In patients with heavy proteinuria, a 24 hour urine protein assessment would be done.

The antenatal book also has a partogram where progress of labour and delivery are recorded. On discharge, the antenatal book is retained at the hospital and is kept in the in-patients file together with her other in-patient records.

For the study, information obtained from in-patient files and antenatal books was entered into a compilation sheet. Total number of deliveries in the study period was obtained from delivery register which is kept in labour ward. We also counted the number of deliveries in three maternity clinics in Gaborone City Council, namely; Old Naledi Clinic, Gaborone West Clinic, Tsholofelo Clinic and Gaborone Private Hospital for the same period so that the area prevalence could be estimated.

Results obtained from the research conducted at PMH were compared with the results of the research done at LCH in Malawi.

Data analysis: Information obtained from patients case records was coded and entered in SPSS computer program version 11 and analyzed. Statistical analysis was performed using the Chi-square on categorical variables.

One way between-groups analysis of variance (ANOVA) was used to compare outcome in different groups of patients, that is; those with hypertension without proteinuria, mild pre-eclampsia and severe pre-eclampsia. Independent sample t-test was used to compare mean scores of continuous variables for Princess Marina Hospital and Lilongwe Central Hospitals. P-values equal or less than 0.05 were considered statistically significant.

CHAPER 5

SUMMARY OF THE RESULTS:

This chapter summarizes results presented in articles 1 and 2.

Article 1

Hypertensive disorders of pregnancy, complications and obstetric outcome at Princess Marina Hospital, Gaborone, Botswana.

Nkubito GK, Stray-Pedersen B, Hussain A

OBJECTIVES: To determine the prevalence, maternal complications, foetal outcome and characteristics of patients with HDP.

SETTING: Princess Marina Hospital, a tertiary and referral Hospital in Gaborone, Botswana.

MATERIALS AND METHODS: A retrospective chart review of all hypertensive women who delivered at PMH from December 2002 to April 2003 was done.

Information from patients' records was entered on a compilation sheet which was entered in SPSS program and analyzed. Prevalence rates (per 1000 deliveries) were estimated by type of hypertension. Demographic characteristics, maternal complications and perinatal outcome were also determined.

RESULTS: Of 1919 deliveries at Princess Marina Hospital during the study period, there were 100 cases of hypertensive disorders of pregnancy giving a prevalence of 52.1 per 1000 deliveries. Twenty one cases had chronic hypertension of which 11 (52%) developed superimposed pre-eclampsia while 10(48%) had no proteinuria.

Of 79 patients with pregnancy induced hypertension, 36 (46%) had hypertension without proteinuria, 42(53%) had pre-eclampsia and 1(1%) had eclampsia.

Age ranged from 18 to 47 years with a mean age of 29.5 years. Teenagers were 8 cases out of 100. Maternal complications were HELLP syndrome (3 cases), acute renal failure (2 cases), and disseminated intravascular coagulation (1 case). There were no cases of abruptio placentae, cerebral haemorrhage or maternal death.

Of all deliveries, perinatal complications included preterm deliveries (45%), low birth weight (41%) and still births (17%).

Conclusion: The prevalence of hypertensive disorders of pregnancy was high but there were few maternal complications.

ARTICLE 2

Hypertensive Disorders of Pregnancy: Prevalence, Maternal complications and Perinatal Outcomes at Princess Marina Hospital in Botswana and Lilongwe Central Hospital in Malawi: A Comparative Study.

AUTHORS: Nkubito GK, Kilembe FD, Hussain A, Stray-Pedersen B.

The studies were carried out at Princess Marina Hospital (PMH) in Botswana and Lilongwe Central Hospital (LCH) in Malawi.

Objectives of the study were to determine and compare the prevalence, maternal complications and foetal outcome for Botswana and Malawi.

MATERIALS AND METHODS: A retrospective study was done by reviewing patients' medical records who delivered at PMH from December 2002 to April 2003 and LCH from January 2003 to June 2003. Those with HDP were then selected for the study. The studies were done in the two hospitals separately using similar methods and the results compared.

RESULTS: Of the 1919 women, who delivered at PMH; 100 had hypertensive disorders of pregnancy giving a prevalence rate of 52.1 per 1000 deliveries. Out of 100 cases, 53 patients had pre-eclampsia and one had eclampsia, and these were eligible for a comparative study.

Of 5248 deliveries at LCH only 70 women had hypertensive disorders of pregnancy, thus the prevalence rate was only 13 per 1000 deliveries. All the 70 patients at LCH had either pre-eclampsia or eclampsia and were eligible for a comparative study. There were significant differences in antenatal care of the hypertensive patients: 94% in PMH as compared to 51% in LCH ($p=0.0001$). At LCH, 66% ($n=46$) of the cases had pre-

eclampsia of which 41% (n=29) had mild pre-eclampsia and 24% (n=17) with severe pre-eclampsia and 34 % (n=24) had eclampsia of whom one died.

At Princess Marina Hospital, of the 54 cases, 34 had mild pre-eclampsia, 19 had severe pre-eclampsia and 1 had eclampsia.

With regards to perinatal outcome, 52% (n=28) of Princess Marina patients had low birth weight babies compared to 39% (n=27) at Lilongwe Central Hospital. The frequency of preterm delivery was similar, 54% (n=29) in Princess Marina patients and 47% (n=34) at Lilongwe Central Hospital.

CONCLUSION: Prevalence of hypertensive disorders of pregnancy was lower at Lilongwe Central Hospital which might be due to unrecorded home deliveries. There were more maternal complications at Lilongwe Central Hospitals which may be attributed to under utilization of antenatal care services.

RECOMMENDATIONS:

We recommend that antenatal care coverage in Malawi should be increased so that patients who are at risk of developing hypertensive disorders of pregnancy are monitored and also to prevent those with hypertension in pregnancy to progress to severe forms.

The high rate of chronic hypertension at Princess Marina Hospital may be due to the fact that most women were old and most likely they had essential hypertension, but more investigations should be done to find out if there are other underlying causes. Another reason for high prevalence of chronic hypertension may be due to the fact that women presented early for antenatal care and this made diagnosis possible. Women with chronic hypertension need close monitoring to avoid perinatal complications.

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CHAPTER SIX: ARTICLES

Article 1

HYPERTENSIVE DISORDERS OF PREGNANCY, COMPLICATIONS AND OBSTETRIC OUTCOME AT PRINCESS MARINA HOSPITAL, GABORONE, BOTSWANA.

Nkubito GK, Stray-Pedersen B, Hussain A.

ABSTRACT

OBJECTIVES: To determine the prevalence, maternal complications, foetal outcome and characteristics of patients with hypertensive disorders of pregnancy.

Setting: Princess Marina Hospital (PMH), a tertiary and referral Hospital in Gaborone, Botswana.

MATERIALS AND METHODS: A retrospective chart review of all hypertensive women who delivered at PMH from December 2002 to April 2003 was done.

Information from patients' records was entered on a compilation sheet which was entered in SPSS program and analyzed. Prevalence rates (per 1000 deliveries) were estimated by type of hypertension. Demographic characteristics, maternal complications and perinatal outcome were also determined.

RESULTS: Of 1919 deliveries at PMH during the study period, there were 100 cases of hypertensive disorders of pregnancy giving a prevalence of 52.1 per 1000 deliveries. Twenty one cases had chronic hypertension of which 11 (52%) developed superimposed pre-eclampsia while 10(48%) had no proteinuria.

Of 79 patients with pregnancy induced hypertension, 36 (46%) had hypertension without proteinuria, 42(53%) had pre-eclampsia and 1(1%) had eclampsia.

Age ranged from 18 to 47 years with a mean age of 29.5 years. Teenagers were 8 cases out of 100. Maternal complications were HELLP syndrome (3 cases), acute renal failure (2 cases), and disseminated intravascular coagulation (1 case). There were no cases of abruptio placentae, cerebral haemorrhage or maternal death.

Of all deliveries, perinatal complications included preterm deliveries (45%), low birth weight (41%) and still births (17%).

Conclusion: The prevalence of hypertensive disorders of pregnancy was high but there were few maternal complications.

INTRODUCTION:

Hypertensive disorders of pregnancy include chronic hypertension in pregnancy and pregnancy induced hypertension. Hypertension complicates about 10% of all pregnancies generally and pre-eclampsia complicates about 5%. Eclampsia accounts for about 12% of all maternal death World wide.

In Botswana eclampsia was the second cause of maternal mortality between 1982 and 1988. Hypertensive disorders of pregnancy are most common cause of in patient obstetric morbidity in Botswana. The prevalence, complications and perinatal outcome in Princess Marina Hospital has not yet been documented. We there fore carried out this research to determine the prevalence of hypertensive disorders of pregnancy, maternal complications and foetal out come in hypertensive patients with a view to improve outcome of deliveries.

MATERIALS AND METHODS: This was a retrospective study of patients with hypertensive disorders of pregnancy who delivered at PMH from December 2002 to April 2003. Hypertension was diagnosed in antenatal period, during labour and within 48 hours post partum period. Hypertension was defined as a diastolic blood pressure equal or greater than 90mmHg recorded on two occasions at least 4-6 hours apart. Proteinuria was significant when two random samples taken 4-6 hours apart tested 1+ or more on reagent strip or one 24 hour urine collection with a total protein excretion equal or greater than 300mg/24 hours.

Chronic hypertension was defined as hypertension which occurs before 20 weeks of gestation; if hypertension occurs after 20 weeks of gestation, during labour or within 48

hours of delivery is classified as Pregnancy Induced Hypertension (PIH).

Pregnancy induced hypertension was classified into 4 categories depending on the severity and presence of proteinuria: hypertension without proteinuria, mild pre-eclampsia, severe pre-eclampsia and eclampsia.

Ethical clearance was obtained from Norway ethical committee, Office of the President, Botswana, Gaborone City Council and Princess Marina ethical review board.

Total number of deliveries was obtained from birth registers at Princess Marina Hospital, Old Naledi clinic, Gaborone West Clinic, Tsholofelo Clinic and Gaborone Private Hospital. A compilation sheet was used to extract information from the patient's case records. The information extracted included demographic data, booking status, antenatal care attendance, records of labour and delivery, maternal complications, investigations, treatment and perinatal outcome.

Information obtained was coded and entered in SPSS version 11.0 program and analyzed. Statistical analysis was performed using the Chi-square on categorical variables. One way between-groups ANOVA was used to compare outcome in different groups of patients, that is; those with hypertension without proteinuria, mild pre-eclampsia and severe pre-eclampsia. P-values less than 0.05 were considered statistically significant.

RESULTS OF THE STUDY:

During the study period from December 2002 to April 2003 there were 1919 total deliveries at Princess Marina Hospital and 988 for Gaborone City council clinics and Gaborone Private Hospital. Thus the total number of deliveries in the whole of Gaborone City was 2907. There were 100 cases that fulfilled the criteria of HDP thus giving a prevalence of 52.1 per 1000 deliveries. The area prevalence was estimated using the total number of deliveries in Gaborone (this included deliveries conducted in maternity clinics in Gaborone City Council, Gaborone Private Hospital and Princess Marina Hospital) and was found to be 34.4 per 1000 deliveries. City council clinics refer all cases of HDP and it was assumed that there were few cases who delivered at Gaborone Private Hospital with HDP.

Twenty one cases had chronic hypertension in pregnancy of which 11 developed pre-eclampsia while 10 cases had hypertension without proteinuria. Thus the prevalence of chronic hypertension in pregnancy was 10.9 per 1000 deliveries.

Seventy nine cases had pregnancy induced hypertension of which thirty six cases (46%) had hypertension without proteinuria, 42(53%) had pre-eclampsia and one case (1%) had eclampsia.

The prevalence of pre-eclampsia was 28 per 1000 deliveries and that of eclampsia was 0.5 per 1000 deliveries.

Most of patients with HDP were referrals. Referrals were 93 out of 100 cases. Of the referral cases, 83 were from Gaborone City Council Clinics, 4 were from primary hospitals, 6 were from district hospitals. It was not indicated whether 2 remaining cases were referrals or not.

Demographic features of the study group:

Age: Age ranged from 18 to 47 years, with a mean age of 29.55 years and standard deviation of 7.89. Teenagers comprised 8 of all 100 hypertensive cases.

Marital status: Of all hypertensive cases, 26 were married, 70 were single, and 2 were widows and 2 of them marital status was not known.

Gravidity: Gravidity ranged from 1 to 10. Primigravidae were 32, gravidae 2 to 3 comprised of 38, gravid 4 to 5 comprised of 19 and gravid 6 and more comprised of 11.

Antenatal care attendance: Majority of patients with hypertension had booked for antenatal care (n=95), only 3 had not booked and the status was not known for 2 patients. The gestation age for booking ranged from 10 to 36 weeks of gestation.

Seventy percent of the cases had booked for antenatal care by 24 weeks of gestation, only 4% of the hypertensive cases booked in the first trimester. Women with severe pre-eclampsia were less likely to book for antenatal care compared to women with mild pre-eclampsia and hypertension without proteinuria, p-value=0.001 (table 1).

Clinical features of the study group:

Blood pressure on admission:

The diastolic blood pressure on admission ranged from 90 to 180 mmHg.

Systolic blood pressure ranged from 140 to 240 mmHg.

Oedema on admission:

On admission, 37 patients had no oedema, 21 had mild oedema, 24 had moderate oedema while 8 had generalized oedema and information was missing for ten cases.

Oedema was more common in patients with severe pre-eclampsia compared to those with

mild pre-eclampsia and those without proteinuria, p -value=0.03(table1).

Drug regimens used to treat hypertension:

Most of the hypertensive patients ($n=87$) required methyldopa to control the blood pressure, 73 required nifedipine, 34 required hydralazine while only 4 were given magnesium sulphate. One patient who had eclampsia was given magnesium sulphate therapeutically while the other 3 were given for prophylaxis because of severe pre eclampsia.

Diazepam was given to 3 patients at district hospital and one patient was on enalapril for control of blood pressure and another was given phenobarbitone for controlling seizures which was also prescribed at a district hospital.

Delivery:

Gestation: The minimum gestation age at delivery 24 weeks while the maximum was 44 weeks. There were 45 preterm deliveries, 50 were term deliveries and information was missing for 5 of cases. Pre-term delivery was more common in patients with severe pre-eclampsia compared to those with mild pre-eclampsia and those without proteinuria, p -value=0.001 (table 2). Blood pressure: Diastolic blood pressure at delivery ranged from 60mmHg to 150mmHg while systolic blood pressure ranged from 140 to 190mmHg. This shows that most patients' blood pressure had been controlled at delivery.

Mode of delivery:

Information on mode of delivery was available for 95 of cases and it was missing for 5. Forty-three of cases delivered by spontaneous vertex delivery, 28 were induced, 21 delivered by Caesarian section and 3 delivered by vacuum extraction. Caesarian section rate was 21 % among hypertensive cases compared to 16% in general obstetric

population.

Maternal complications:

The rate of complications was low during the study period; only 3% (n=3) of cases had HELLP syndrome, 2% (n=2) had acute renal failure, one (1%) had disseminated intravascular coagulation and one (1%) had eclampsia. There was no case with pulmonary oedema or cerebral pathology, there were no abruptio placentae and there was no maternal death related to hypertensive disorders of pregnancy during the study period.

Foetal outcome:

Foetal outcome of pregnancy in hypertensive women indicates that there were more males (n=50) than females (n=44), information about sex was not available for six babies. There were 45 preterm deliveries and 50 term deliveries and information was not available for 5 cases. Forty-one of neonates had low birth weight (wt <2500g), 51 had weight equal or greater than 2500 grams and information was missing for 8 neonates. There were 78 live births, 17 still births and information was missing for 5 cases. Of the still birth; 12 were macerated while 5 were fresh. Still-birth rate was calculated at 170 per 1000 total birth compared to 16.7 per 1000 total birth in general obstetric population. Low birth weight and still births were more common in women with severe pre-eclampsia, p-value =0.001 and 0.001 respectively (table 2).

Neonates born to women with severe pre-eclampsia and eclampsia had lower Apgar score compared to neonates born to women with mild pre-eclampsia and those without proteinuria at zero, five and ten minutes; P-value=0.001, 0.001, 0.001 respectively (table 2). Low birth weight accounted for 42 out of 100 deliveries.

DISCUSSION:

In this chapter results of the current study are discussed. The study determines the prevalence of hypertensive disorders of pregnancy, complications and foetal outcome of hypertensive pregnancies in a national referral hospital. Hypertensive disorders of pregnancy accounted for 5.2% of all the deliveries at Princess Marina Hospital and there were no deaths related to hypertensive disorders of pregnancy in the study period. This is greater than the prevalence for Umtata General Hospital, South Africa which was 4.6% (1) and that of Kuwait which was 4.9% (2). This rate was lower than that reported in Harare maternity hospital in Zimbabwe which was 8% (3). The prevalence of hypertensive disorders of pregnancy was higher than that reported in Saudi Arabia by Al-Ghamdi *et al* of 3% (4) and Senegal by Thiam M, Goumbala *et al* of 3.9% (59)

The prevalence of pregnancy induced hypertension was less than that reported for U.K of 5% (6) but higher than that reported in the U.S of 3.6% by Anath *et al* 1995.

Maternal complications in this study included HELLP syndrome, acute renal failure and disseminated intravascular coagulation (DIC), there were no cases of abruption placentae, pulmonary oedema or maternal death. There were fewer complications than those reported in neighbouring countries like South Africa (1) and Zimbabwe (3) this could be due to high rate of antenatal attendance in Botswana which 95% in this study compared to 54.7% at Umtata General Hospital which made diagnosis and prevention of severe complications possible.

Women with chronic hypertension were at high risk of developing superimposed pre-eclampsia this was associated with high rates of adverse perinatal and maternal outcomes. Eleven (52%) women out of 21 with chronic hypertension developed

superimposed pre-eclampsia, while half of them had adverse perinatal outcome. The rate of pre-eclampsia in women with chronic hypertension was higher than that in other studies which reported rates which range from 10% to 25% in mild hypertension and rate in severe chronic hypertension is said to reach around 50% (8). The rate of pre eclampsia in chronic hypertension patients in this study was higher than that reported in Saudi Arabia by Al-Ghamdi et al who reported a rate of 47%.Therefore patients with chronic hypertension should be managed to reduce the maternal risks and achieve optimal perinatal survival. Management should include pre conceptual evaluation and counseling, early antenatal care, frequent antepartum visits to monitor both maternal and foetal well-being, timely delivery and with intensive intrapartum monitoring and proper postpartum management (8).

Foetal complications were low birth weight 41 (41%), intra uterine foetal deaths 17 (17%) and early neonatal death 2 (2%). Low birth weight rate was high in patients with HDP compared to the low birth weight in general obstetric population which was 20%. Still birth rate was 170/1000 births compared to 16.7/1000 still births in general obstetric population during the study period at Princess Marina Hospital.

Other studies have shown that hypertensive pregnancies were associated with increased perinatal mortality and morbidity (9).

In this study, low birth weight and still births were more common in patients with severe hypertension compared to those with mild hypertension.

Maternal age, gravidity, multiple pregnancies, obesity are reported to be a risk factors for pre eclampsia. In our study primigravidae constituted only 32(32%) of all hypertensive patients and this could be because of a big number of multigravidae with chronic

hypertension and some of them may have been un-diagnosed.

Fifty three percent (n=17) of the primigravidae had pre-eclampsia. Teenagers formed only 8% of all hypertensive cases.

In conclusion, the prevalence of hypertensive disorders of pregnancy is high at PMH and Gaborone City Council at large and there is increased maternal and perinatal morbidity. Pre existing hypertension contributes a great deal to the maternal and foetal morbidity and therefore special attention should be given to it to avoid complications.

LIST OF TABLES

Table 1:

Maternal demographics and symptoms reported by the study population.

Variable	hypertension without Proteinuria N=46	mild pre-eclampsia N=34	severe pre-eclampsia and eclampsia N=20	p-value
Age(yrs)	30.1±7.5	28.7±7.9	29.7±7.9	0.73(NS)
Gravidity	3.2±2.1	2.9±2.3	2.5±1.7	0.46(NS)
Booked for ANC(%)	100	100	83	0.001(S)
Gestation at booking(Wks)	21.4±6.4	21.9±5.4	19.9±4.9	0.26(NS)
ANC visits(number)	6.3±2.8	6.6±3.0	5.4±2.8	0.26(NS)
Diastolic BP On admission(mmHg)	100.7±12.0	96.8±6.7	123.4±16.9	0.001(S)
Oedema(%)	38	70	65	0.03(S)
Headache(%)	28	18	45	0.05(NS)
Dizziness(%)	13	12	25	0.67(NS)
Epigastric pain(%)	15	3	25	0.18(NS)
Visual disturbance(%)	0	3	5	0.89(NS)
Nausea +vomiting(%)	3	0	10	0.64(NS)

ANC= antenatal care Wks =weeks BP= Blood pressure mmHg= millimeters of mercury.

Table 2

Maternal and foetal out come for the study population.

Variable	hypertension without Proteinuria N=46	mild pre-eclampsia N=34	severe pre-eclampsia and eclampsia N=20	p-value
HELLP syndrome(%)	0	0	15	0.001(S)
DIC (%)	2	0	0	0.56(NS)
ARF(%)	0	3	6	0.34(NS)
C/section(%)	18	32	15	0.07(NS)
Length of gestation(WKS)	38±4	37±4	34±3	0.001(S)
Preterm delivery(%)	38	38	70	0.001(S)
Low birth WT(%)	35	44	60	0.001(S)
Birth WT(G)	2797.8±814.5	2613±849.9	1996±882.4	0.001(S)
Still births (%)	13	12	37	0.001(S)
Average still birth WT(G)	1578±432	1412±548	1251±428	0.48(NS)
Apgar score at 0min	7±3	6±3	4±4	0.001(S)
Apgar score at 5min	8±2	7±3	5±5	0.001(S)
Apgar score at 10min	9±1	8±2	5±5	0.001(S)

HELLP= Haemolysis, elevated liver enzymes, low platelet count

DIC= disseminated intravascular coagulation

WKS= weeks

WT= weight

G= grams

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PAPER 2

Hypertensive Disorders of Pregnancy: Prevalence, Maternal complications and Perinatal Outcomes at Princess Marina Hospital in Botswana and Lilongwe Central Hospital in Malawi: A Comparative Study.

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ABSTRACT:

Objectives of the study were to determine and compare the prevalence, maternal complications and foetal outcome for Botswana and Malawi.

MATERIALS AND METHODS: A retrospective study was done by reviewing patients' medical records who delivered at Princess Marina Hospital (PMH) from December 2002 to April 2003 and Lilongwe Central Hospital (LCH) from January 2003 to June 2003. Those with hypertensive disorders of pregnancy were then selected for the study. The studies were done in the two hospitals separately using similar methods and the results compared.

RESULTS: Of the 1919 women, who delivered at PMH; 100 had hypertensive disorders of pregnancy giving a prevalence rate of 52.1 per 1000 deliveries. Out of 100 cases, 53 patients had pre-eclampsia and one had eclampsia, and these were eligible for a comparative study.

Of 5248 deliveries LCH only 70 women had hypertensive disorders of pregnancy, thus the prevalence rate was only 13 per 1000 deliveries. All the 70 patients at LCH had either pre-eclampsia or eclampsia and were eligible for a comparative study. There were significant differences in antenatal care of the hypertensive patients: 94% in PMH as

compared to 51% in LCH ($p=0.0001$). At LCH, 41.4% ($n=29$) had mild pre-eclampsia, 24.3% ($n=17$) and 34.3 % ($n=24$) had eclampsia.

At PMH, of the 54 cases, 63% ($n=34$) had mild pre-eclampsia, 35% ($n=19$) had severe pre-eclampsia and 2% ($n=1$) had eclampsia. There were 4% ($n=3$) cases of acute renal failure at LCH and 4% ($n=2$) at PMH. There were 4% ($n=2$) cases of HELLP syndrome at PMH and none recorded at LCH.

With regards to perinatal outcome, 56% of PMH patients had low birth weight babies compared to 41% at LCH. The frequency of preterm delivery was similar, 57% in PMH and 55% at LCH.

CONCLUSION: Prevalence of hypertensive disorders of pregnancy was lower at LCH which might be due to unrecorded home deliveries. There were more maternal complications at LCH which may be attributed to under utilization of antenatal care services.

INTRODUCTION:

Hypertensive disorders of pregnancy include chronic hypertension in pregnancy and pregnancy induced hypertension. Hypertension complicates about 10% of all pregnancies and pre-eclampsia complicates about 5% (1). Eclampsia accounts for 12% of all maternal deaths world wide (2). The most severe complications of hypertensive disorders of pregnancy are observed in poor settings where antenatal diagnosis and management of these diseases is deficient. This article is a comparison of two researches carried out in LCH, Malawi and PMH, Botswana on patients who had pre-eclampsia and eclampsia in the period December 2002 to April 2003 for PMH and January to June 2003 for LCH.

Malawi is in South-Eastern Africa and Botswana in Southern Africa. The two countries are different in terms of economy; Malawi being a low income country and Botswana being a middle income country. Health indicators for the two countries are different. Maternal mortality ratio in Malawi is 1120 per 100,000 live births while in Botswana it is 330 per 100,000 live births. Antenatal care attendance for the two countries is officially 91% while skilled attendance at delivery for Malawi is 56% and for Botswana is 94% (3). In Malawi almost half of the women are delivered at home by relatives or traditional birth attendants while in Botswana hospital/clinic deliveries are common.

The purpose of this article is to compare the prevalence, maternal complications and fetal outcome in patients with pre-eclampsia and eclampsia in Malawi and Botswana with view to improve antenatal care and pregnancy outcome in hypertensive women in both countries.

MATERIALS AND METHODS:

This was a comparison of two studies done in Malawi and Botswana on pre-eclampsia and eclampsia. In both studies retrospective review of medical records was done for patients who delivered in the period from December 2002 to April 2003 for PMH and from January to June 2003 for LCH. Cases that had pre-eclampsia and eclampsia were compared. Cases excluded were those who had hypertension without proteinuria. This is because there were no recorded cases of hypertension without proteinuria at LCH while they were 46 of 100 at PMH.

Mild pre-eclampsia was defined as two readings of diastolic blood pressure 90 to 110mmHg, 4 to 6 hours apart, after 20 weeks of gestation and proteinuria.

Severe pre-eclampsia, the diastolic blood pressure is equal or greater than 110 mmHg after 20 weeks of gestation. There may be severe headache, blurred vision, epigastric pain, hyper reflexia, oliguria, proteinuria (protein equal or greater than 5g per 24 hours or dipstick 3+), and increased weight equal or more than 1000gm per week and the patient is conscious.

A compilation form was used to extract information from patient's case records. The information included demographic data, booking status, antenatal attendance, records of labour and delivery, complications and perinatal outcome.

The information obtained was coded and entered in SPSS version 11.0 and analyzed. Descriptive statistics were worked out. Cases from the two hospitals were compared using Independent Sample t-test and p-value equal or less than 0.05 was considered statistically significant.

RESULTS:

During the study period, out of 1919 total deliveries at PMH, there were 53 cases of pre-eclampsia and one case of eclampsia giving a prevalence of 28 per 1000 deliveries. Out of 5248 deliveries at LCH, there were 70 cases that fulfilled the inclusion criteria of which 46(66%) had pre-eclampsia and 24(34%) had eclampsia giving the prevalence of 13 per 1000 deliveries.

Demographic characteristics study population:

Age: The age range of PMH patients was from 18 to 47 with a mean of 29.4 years, teenagers were 3(5.6%) while for LCH cases age range was from 16 to 41 with a mean of 23.9 years and teenagers were 5(10.9%). As observed on table 1 patients were younger at LCH compared to PMH patients ($P=0.001$).

Gravidity: Gravidity for PMH cases ranged from 1 to 10 pregnancies with a mean of 2.9 while at LCH it ranged from 1 to 7 with a mean of 2.2 pregnancies. No statistical significance was observed between the two hospitals.

Education: Patients at PMH had higher education than LCH patients. Seventy two percent 72%($n=39$) of PMH patients had secondary education and higher compared to 40%($n=28$) at LCH ($P=0.02$).

Marital status: Ninety three percent ($n=65$) of LCH cases were married compared to only 18% ($n=10$) of PMH patients ($P=0.001$). This difference may be due to cultural differences in the two countries.

Antenatal management:

Ninety four percent ($n=51$) of PMH patients had booked for antenatal care while only 51% ($n=36$) at LCH had been booked ($P=0.001$). More over 52% of the cases at PMH

had booked by 24 weeks of gestation compared to 1% at LCH ($P=0.001$). Patients at LCH and PMH had made an average of 2 and 6 visits respectively by the time of delivery ($P=0.001$).

Regarding drug treatment, there were no standardized regimens in both hospitals. Monotherapy with Methyldopa was commonly used at both hospitals for mild pre-eclampsia with some patients in the same category not getting any drug therapy. Both hospitals had various combined therapies for treatment of severe pre-eclampsia but with diazepam added in the treatment of severe pre-eclampsia and eclampsia at LCH while magnesium sulfate was added for impending eclampsia at PMH.

Reported symptoms:

The most common symptom was headache followed by epigastric pain. As observed in table 2, LCH cases had more symptoms than PMH cases. The cases were also more severe at LCH.

Delivery:

There were 54% ($n=29$) pre-term deliveries for PMH and 49% ($n=34$) for LCH.

Induction of labour was more common at PMH where 20 (37%) of cases were induced; there was no record of induction of labour at LCH. Caesarian section rate at PMH was 13 (24%) compared to 25 (36%) at LCH ($p=0.10$).

Maternal complications:

There were more maternal complications at LCH compared to PMH. Thirty four percent ($n=24$) of LCH patients had eclampsia compared to only two percent ($n=1$) of the cases at PMH. Acute renal failure was observed in the similar frequency, 4% ($n=3$) of LCH

patients and 4% (n=2) of PMH patients. HELLP syndrome was reported in 4% (n=2) of patients at PMH and none at LCH.

Perinatal out come:

There were more low birth weight babies at PMH 52% (n=28) than LCH 39%(n=27) (P=0.11). There were 12 (22%) still birth at PMH compared to 7 (10%) at LCH. There was one neonatal death at LCH and none was recorded at PMH.

DISCUSSION

We compared pre-eclampsia and eclampsia frequency of two African countries with different economical background. Botswana situated in Southern Africa has a middle economy while Malawi situated in South East Africa is among the least developing countries. We compared patients referred to comparable referral hospitals. The prevalence of pre-eclampsia at PMH was 28 per 1000 deliveries. The prevalence of pre-eclampsia at LCH was 8 per 1000. There were 24 eclamptic cases at LCH and one eclamptic case at PMH. The trend of eclampsia in these two hospitals confirms previous studies that established a relationship between high maternal mortality ratios with increased eclampsia (4). Malawi has a maternal mortality ratio of 1120 per 100,000 live births as compared to 330 per 100,000 live births for Botswana. The higher cases of eclampsia at LCH are attributed to underutilization of antenatal care. Only 36 (51%) patients at LCH booked for antenatal care as compared to 51 (94%) patients who booked for antenatal care at PMH. In Botswana the women came significantly earlier and had more visits than in Malawi patients. A good and regular antenatal care with screening for high risk pregnancies and quality treatment prevents hypertensive cases to progress into eclamptic stage (5, 6, 7, 8). Primigravidity was a prominent characteristic of patients with pre-eclampsia and eclampsia at both (PMH and LCH) hospitals with 31% (n=17) and 50% (n=35) affected respectively. This is in agreement with previous studies (6, 9, 10). Teenage pregnancy was not a common characteristic of patients in our study, but young age (16 to 24 years) was significantly affected by pre-eclampsia and eclampsia. Other characteristics for pre-eclampsia and eclampsia such as previous history of pre-eclampsia, twin pregnancies, heredity (family history), and body mass index were not studied in detail due to limited of available data. Pre-eclampsia and eclampsia are known for adverse maternal outcomes (10, 11, 12).

In our studies, there were more maternal complications at LCH than PMH. At PMH two cases developed HELLP syndrome, two had acute renal failure and no maternal death while at LCH there 24 eclamptic cases, three cases with acute renal failure and one maternal death.

Regarding the perinatal outcome, we found higher still births at PMH 12 (22%) as compared to 7 (10%) at LCH.

Our findings, show that at PMH 28 (52%) had low birth weight babies compared to LCH with 27(39%). This could be due to high rate of induction of labour at PMH.

Severe cases of HDP such as severe pre-eclampsia and eclampsia result into preterm deliveries. Our studies established that of the severe pre-eclamptic patients, 15(75%) at PMH had preterm deliveries while at LCH they were 7(41%). Amongst the eclamptic patients (n=24) at LCH, 17 (71%) of them had preterm deliveries (table 3). Severe preterm (those who delivered at 32 weeks or less), were 18% at PMH and 14% at LCH but this was not statistically significant ($P=0.50$). Preterm delivery and low birth weight were also not statistically different in the two countries.

Most patients at both hospitals progressed into spontaneous vaginal delivery with 20 patients (37%) induced at PMH and no record of induction of labour at LCH. In the latter hospital most of the patients came in a critical stage necessitating caesarian section. In fact caesarian section was done mostly in mild preeclampsia at PMH while at LCH it was mostly done on severe cases such as eclampsia. Thirteen (54%) of the 24 eclamptic patients at LCH were delivered by caesarian section.

Many previous studies have tried to establish a standard treatment but there is no global adopted regimen, hence different regimes were used at PMH and LCH respectively.

In conclusion, the prevalence in Botswana is greater than that of Malawi. Maternal complications were more at LCH. There were no statistical differences in the foetal outcome between the two hospitals. The poor maternal outcome at LCH may be attributed to underutilization of antenatal care services at LCH.

LIST OF TABLES:

Table 1

Patients' characteristics, maternal complications and foetal outcomes at PMH and LCH.

Hospital	PMH N=54	LCH N=70	p value
<u>Demographic features:</u>			
Mean maternal age (yrs)	29.4±8.0	23.9±5.3	0.001(S)
Parity (mean)	1.7±2.0	1.1±1.6	0.10(NS)
Secondary Education and higher	39 (72%)	28(40%)	0.001(S)
<u>Antenatal care:</u>			
Booked for antenatal visit	51(94%)	36(51%)	0.001(S)
Gestational age at booking (weeks)	21.2±5.2	33.5±4.8	0.0001(S)
Gestational length (weeks)	36±4	36±4	0.66(NS)
Average number of ANC visits	6	2	0.001(S)
<u>Maternal complications</u>			
Eclampsia	1(2%)	24(34%)	0.001(S)
Maternal death	0	1	
Acute renal failure	2(4%)	3(4%)	0.65(NS)
HELLP syndrome	2(4%)	0	0.09(NS)
<u>Birth:</u>			
Caesarian section	13(24%)	25(36)	0.10(NS)
Induced labour	20(37%)	0	0.001(S)
<u>Foetal outcome</u>			
Low birth weight	28(52%)	27(39%)	0.11(NS)
Pre-term delivery	29(54%)	34(49)	0.18(NS)
Still birth	12 (22%)	7(10)	0.04(S)
Neonatal death	0	1	

NS= not significant S= significant

Table 2

Symptoms reported by the patients both at PMH and LCH.

Symptom	PMH (n=54)	LCH(n=70)
Headache	15(28%)	28(40%)
Dizziness	9(17%)	7(10%)
Epigastric pain	7(13%)	18(26%)
Visual disturbance	1(2%)	3(4%)
Nausea	2(4%)	1(1.4%)
Vomiting	2(4%)	4(6%)
Convulsions	1(2%)	24(34%)

Table 3

Perinatal outcome for patients with pre-eclampsia and eclampsia at PMH and LCH.

	Mild pre-eclampsia		Severe pre-eclampsia		Eclampsia	
	PMH(N=34)	LCH(N=29)	PMH(N=19)	LCH(N=17)	PMH(N=1)	LCH(N=24)
Caesarian section	10(29%)	8(28%)	3(15%)	4(23%)	0	15(62%)
Low birth weight	14(41%)	2(7%)	13(65%)	10(59%)	1	15(62%)
Still birth	6(18%)	1(3%)	6(30%)	1(6%)	0	5(21%)
Preterm delivery	12(35%)	10(34%)	15(75%)	7(41%)	1	17(71%)

Reference:

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ANNEX 1

COMPILATION SHEET:

IDENTIFICATION NUMBER AND INITIALS:

REFERRED 1) No 2) Yes

If yes, referred from

DEMOGRAPHIC FEATURES (circle as appropriate)

1. Age (years)
2. Education level..... 1) none 2) primary 3) secondary 4) tertiary
3. Marital status 1) Married 2) Single 3) Separated/divorced 4) Widow
4. Gravidity.....
5. Parity
6. How many children/pregnancies are: 1) live born? 2) still-born?
- 3) abortion?..... 4) living today

PAST MEDICAL HISTORY:

1. Chronic hypertension..... 1)no 2) yes
2. Pregnancy induced hypertension 1) no 2)yes
3. Diabetes mellitus 1)no 2) yes
4. Other (specify)

PRENATAL CARE ATTENDANCE

1. Booked 1) no 2)yes
2. Gestation age at booking.....
3. Number of routine prenatal care visits.....
4. Number of non-routine prenatal care visits.....
5. BP at booking
6. Weight at booking
7. At what gestation age did the blood pressure increase?

CLINICAL FEATURES ON ADMISSION (circle as appropriate) :

1. Headachei) no 2)yes 3) Not recorded
2. Dizziness.....1) no 2) yes 3) Not recorded
3. Epigastric pain..... 1) no 2)yes 3) Not recorded
4. Visual disturbance..... 1) no 2) yes 3) Not recorded
5. Nausea..... 1) no 2) yes 3) Not recorded
6. Vomiting..... 1) no 2) yes 3) Not recorded
7. Convulsions..... 1) no 2) yes 3) Not recorded
8. Blood pressure:
9. Oedema..... 1) None 2) Mild 3) Moderate 4) Generalized
10. Height (Metres).....
11. Weight (Kilograms).....

INVESTIGATIONS:

1. Haemoglobin 1) lowest Hb 2) highest Hb
2. Platelet count.....
3. Liver function 1) Normal 2) Deranged.
4. Kidney function tests..... 1) Normal 2) Deranged
5. Urea =.....,
6. Creatinine
7. Twenty-four hour urine protein
8. Dipstick urinalysis..... 1) 1) + 2) 2+ 3) 3+

ANTENATAL MANAGEMENT:

1. Number of admissions in this pregnancy.....
2. Drugs given during pregnancy
 - i. Methyldopa..... 1) no 2) yes
 - ii. Nifedipine 1) no 2) yes
 - iii. Hydrallazine..... 1) no 2) yes
 - iv. Magnesium sulphate 1) no 2) No
 - v. Diazepam..... 1) no b)yes
 - vi. Other (Specify).....

DELIVERY/ TERMINATION OF PREGNANCY :

1. Gestation.....
2. Blood pressure.....
3. Proteinuria 1) 1+ 2)2+ 3)3+
4. Mode of delivery 1) SVD 2) Induced 3) Vacuum extraction 4) Caesarean section
4) Other (specify)

MATERNAL COMPLICATIONS (circle):

1. Eclampsia 1) no 2) yes 3) if yes, comments.....
2. Abruptio placentae 1) no 2)yes 3) if yes, comments.....
3. HELLP syndrome... 1) no 2) yes 3) if yes, comments
4. DIC 1) no 2) yes 3) if yes, comments
5. Acute renal failure ...1) no 2) yes 3) if yes, comments
6. Pulmonary oedema...1) no 2) yes 3) if yes, comments
7. cerebral pathology ...1) no 2) yes 3) if yes, comments
8. Maternal death 1) no 2) yes 3) if yes, comments

PERINATAL OUTCOME

1. Birth weight
2. Sex 1) male 2) female
3. Apgar score 1) at 0 min..... 2) at 5 min. 3) at 10 min.

4. Out come of delivery 1) Live 2) Macerated still birth c) fresh still birth
5. Neonatal death..... 1)no 2) yes

PUPERAL PERIOD

1. Placenta weight.....
2. Estimated blood loss.....
3. Duration of hospital stay after delivery.....
4. Blood pressure at discharge.....
5. Proteinuria at discharge 1) no 2) yes

Anex 2

Dr Grace Kangwagye Nkubito
Gaborone Village
P.O Box 81283
Gaborone, Botswana.
11/07/2003

THE CHAIRMAN
PRINCESS MARINA HOSPITAL
ETHICAL REVIEW BOARD
P.O BOX 258
GABORONE, BOTSWANA.

Dear Sir,

RE: APPLICATION FOR ETHICAL CLEARANCE FOR MY RESEARCH PROJECT

I am a master's student at Institute of General Practice and community medicine at the University Of Oslo, Norway.

I would like to carry out a research at Princess Marina Hospital for my master's thesis.

The title of my project is: Prevalence of hypertensive disorders of pregnancy, complications and obstetric outcome at Princess Marina Hospital, Gaborone, Botswana. This will involve the review of records of women who had hypertensive disorders of pregnancy.

The research has already been cleared by ethical committee of Norway and The Office of the President, Botswana.

Ethical issues like confidentiality of patients will be considered by not indicating the names of patients on compilation sheets, and the hospital records will not be taken away from the facility. Information obtained from the records will be kept confidential.

I hope to hear from you in due course.

Yours faithfully,

Dr Grace Kangwagye Nkubito.

Anex 3

Dr Grace Kangwagye Nkubito
P.O BOX 81283
Gaborone.
Tel. 3973136
Cell: 71589925
12/12/2003

THE TOWN CLERK
GABORONE CITY COUNCIL.

Dear Sir/madam,

RE: APPLICATION FOR PERMISSION TO CARRY OUT RESEACH:

I am a student at University of Oslo Norway. I am doing a research entitled: Hypertensive disorders of pregnancy, complications and obstetric outcome at Princess Marina Hospital. While doing data collection I found out that most of hypertensive mothers were referrals from city council clinics. I would therefore like to find out the number of deliveries conducted in Gaborone city council maternity clinics from December 2002 to April 2003. I would like to determine the prevalence of hypertensive disorders of pregnancy in Gaborone.

Find attached copies of clearances of my proposal by ethical committee of Norway, Princess Marina Ethical review board and office of the president. Attached also is a copy of my research proposal.

I hope my application will be put under consideration.

Yours faithfully

Dr Grace Kangwagye Nkubito.

